Cascadable Broadband InGaP MMIC Amplifier
DC-14 GHz AKA-1500D

Description

Akoustis' AKA-1500D cascadable broadband InGaP HBT MMIC amplifier is a low-cost high-performance solution for your general-purpose RF and microwave amplification needs. This 50-ohm gain block is based upon a mature and reliable HBT (Heterojunction Bipolar Transistor) process and utilizes proprietary MMIC design techniques, providing best in class performance for small-signal applications.

The AKA-1500D has a very simple application circuit including external DC decoupling caps which limit the low-frequency response as well as an external dropping resistor that provides excellent performance stability and design flexibility. The AKA-1500D is available in die form.

Features

- Reliable Low-Cost InGaP HBT Design
- Extremely Broadband (optimized for low parasitic reactances)
- Excellent Gain Flatness and High P1dB
- Single Power Supply Operation
- 50 Ω Input/Output Matched

Applications

- Narrowband and Broadband Applications for both Commercial and Military Designs
- Linear & saturated amplifier applications.
- Gain stage or driver amplifiers utilized in many applications such as point to point radio, test equipment, VSAT, and military communication systems.

Ordering Information

Part Number	Description
AKA-1500D	Individual Die

Absolute Maximum Ratings

Parameter	Rating	Units
RF Input Power	+20	dBm
Power Dissipation	308	mW
Device Current	74	mA
Channel Temperture	150	°C
Operating Temperature	-45 to +85	°C
Storage Temperature	-65 to +150	°C
ESD Level (HBM)	Class 1A	

Caution! ESD sensitive device.

Caution! Exceeding any one or a combination of these limits may cause permanent damage.

RoHS Compliant

Nominal Operating Parameters

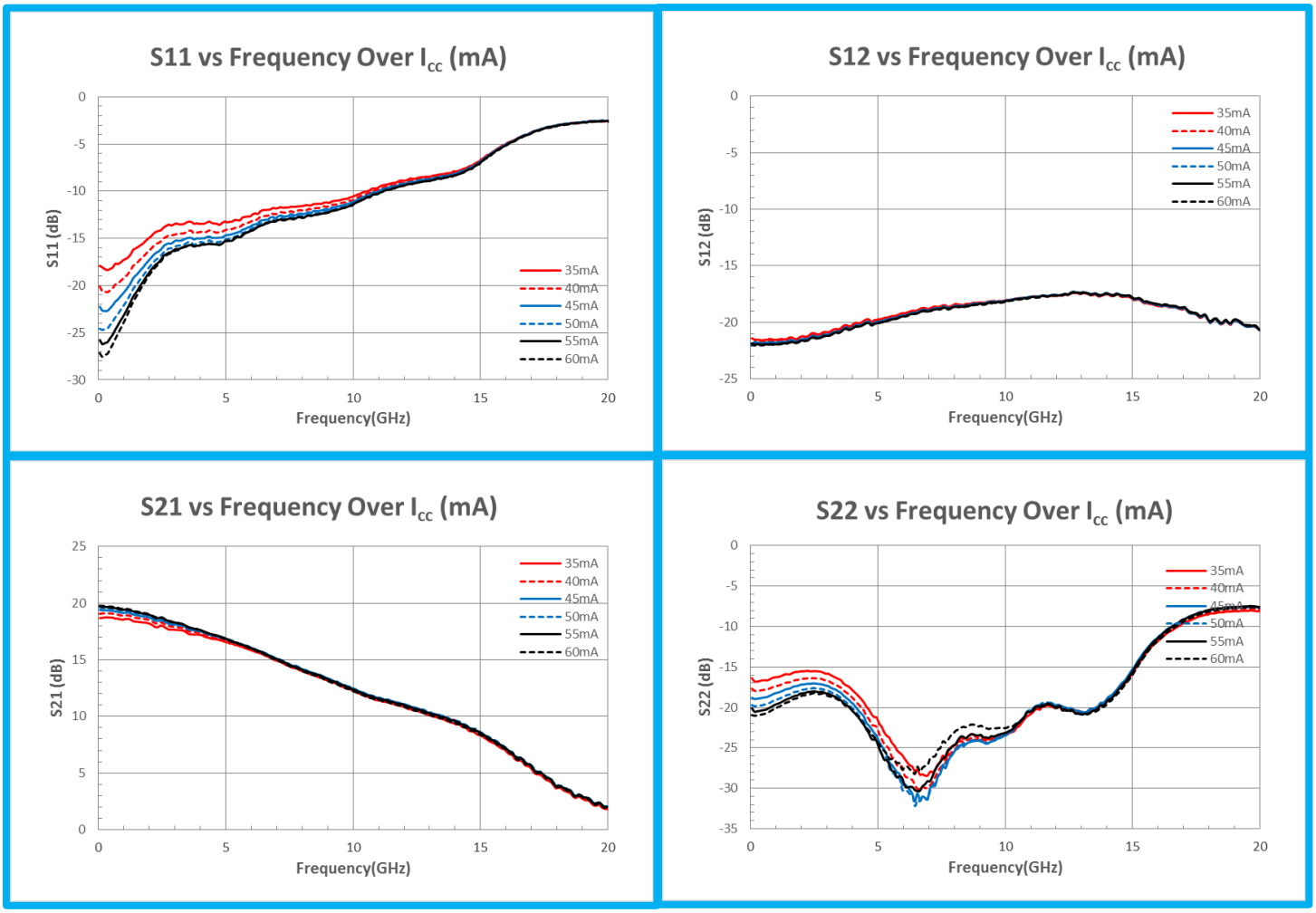
Parameter	Test Conditions	Units	Min.	Typ.	Max.
General Performance		Vd = +4.2V, Icc=50mA, Z_0=50Ω, Ta=+25°C			
Small Signal Power Gain, S_{21}	f=0.1 to 1.0 GHz f=1.0 to 4.0 GHz f=4.0 to 6.0 GHz f=6.0 to 12.0 GHz f=12.0 to 14.0 GHz	dB dB dB dB dB	19.2 17.4 15.9 10.9 9.5	19.5 18.4 16.5 13.5 10.5	
Gain Flatness, G_F	f=0.1 to 6.0 GHz	dB		±1.8	
Input and Output VSWR	f=0.1 to 4.0 GHz f=4.0 to 6.0 GHz f=6.0 to 12.0 GHz			2.0:1 2.4:1 2.5:1	
Bandwidth, BW	BW3 (3dB)	GHz		5.5	
Output Power @ 1-dB Compression, P1dB	f =2.0 GHz f =6.0 GHz f=12.0 GHz	dBm dBm dBm		16.3 16.4 13.7	
Noise Figure, NF	f=3.0 GHz	dB		5.5	
3rd Order Intercept, IP3	f=2.0 GHz	dBm		+28	
Reverse Isolation,S_{12}	f=0.1 to 14.0 GHz	dB		-17	
Device Voltage, Vd		V	4.1	4.2	4.3
Gain Temperature Coefficient, $\partial G_T/\partial T$		dB/°C		-0.0015	

Nominal Operating Parameters

Parameter	Condition	Units	Min.	Typ.	Max.
MTTF versus Temperature at Icc = 50mA					
Case Temperature		°C		85	
Junction Temperature		°C		107	
MTTF		hours		$>10^6$	
Termal Resistance					
θ_{JC}	$\theta_{JC} = (J_T - T_{CASE})/(V_D * I_{CC})$	°C/W		212	

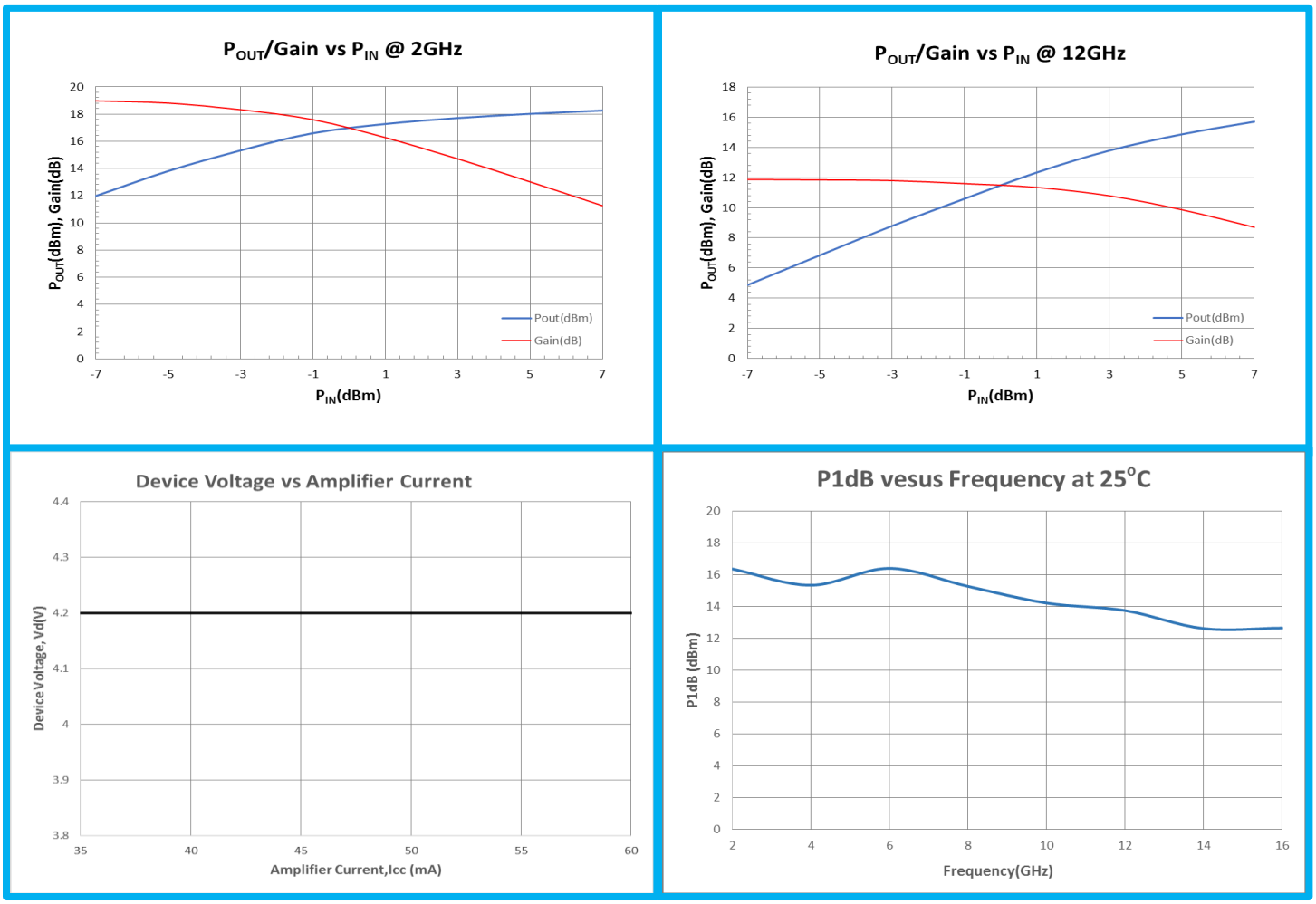
Note: Results shown above were obtained using a micro-x package test fixture.

Typical Performance



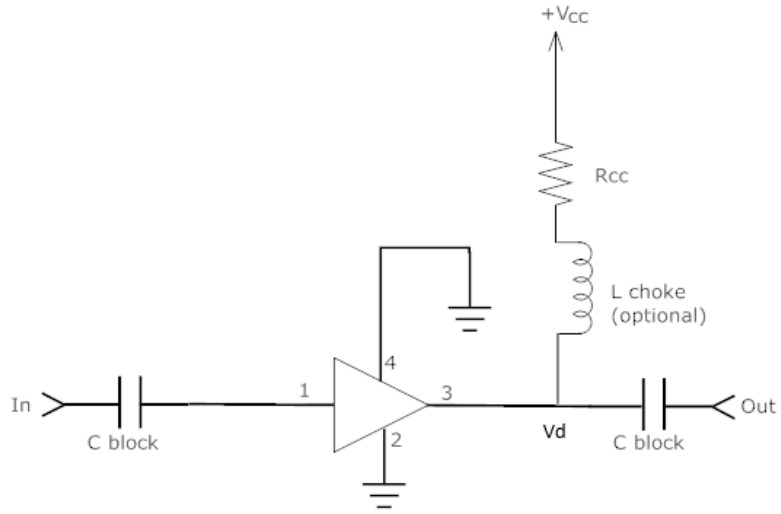
Note: The s-parameter gain results shown above were obtained using a micro-x package test fixture.

Typical Performance (continued)



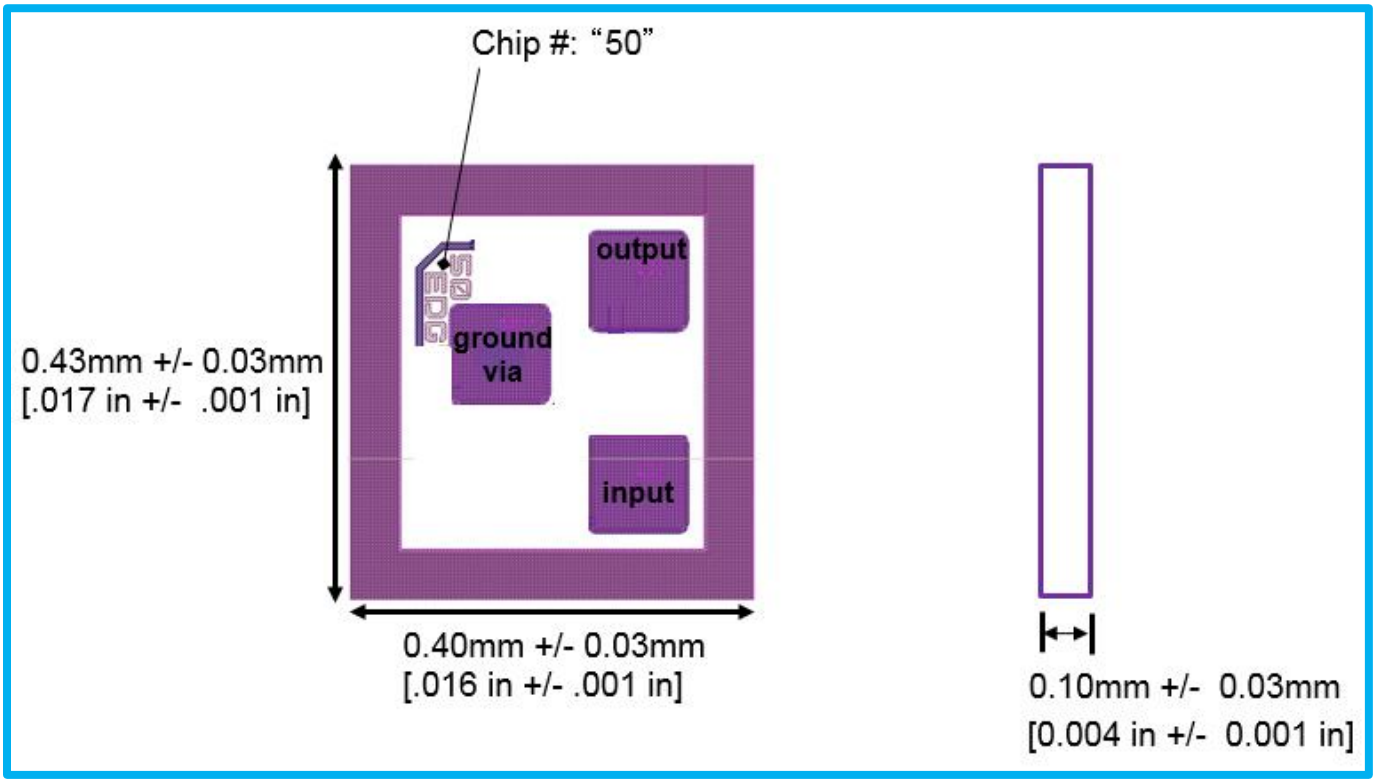
Note: The s-parameter gain results shown above were obtained using a micro-x package test fixture.

Typical Bias Configuration



Recommended Bias Resistor Values @ Icc = 50 mA						
Supply Volatage, V_{cc} (V)	5	8	10	12	15	20
Bias Resistor, Rcc (Ω)	16	76	116	156	216	316

Die Drawing



Name	Description
RF_{input}	RF input pin. A DC blocking capacitor specified for the frequency of operation should be used.
RF_{output}	RF output and bias pin. Biasing is accomplished with an external series resistor and a choke inductor. The resistor value is determined by the following equation: $R = \frac{(Vcc - Vd)}{Icc}$
Gnd	Ground connection to bottom of die through ground via.